WHAT IS CLAIMED IS:

1. A method for extending the lifetime of a photorefractive material or removing voids, cracks or other defects in a photorefractive material, comprising:

providing a photorefractive material, wherein the photorefractive material has an optical property that degrades when the photorefractive material is maintained at a temperature in the range of T_1 to T_2;

heating the photorefractive material to a temperature T_3 or higher for an annealing time that is effective to maintain or at least partially restore the optical property, wherein T_3 is greater than T_2; and

cooling the photorefractive material to a temperature in the range of T_1 to T_2.

2. The method of Claim 1 in which T_1 is about 0°C or below.

3. The method of Claim 2 in which T_1 is about -50°C or below.

4. The method of Claim 3 in which the photorefractive material has a glass transition temperature that is about T_2 or less.

5. The method of Claim 4 in which the glass transition temperature is in the range of about 150°C to about 0°C

6. The method of Claim 5 in which the glass transition temperature is in the range of about 100°C to about 0°C

7. The method of Claim 6 in which the glass transition temperature is in the range of about 50°C to about 15°C

8. The method of Claim 1 in which T_2 is about 100°C or greater.

9. The method of Claim 1 in which at least a portion of the photorefractive material forms a second phase within the photorefractive material when the photorefractive material is maintained at a temperature in the range of T_1 to T_2.

10. The method of Claim 9 in which the photorefractive material and the second phase combine to form a single phase during the heating of the photorefractive material to the temperature T_3 for the annealing time.

11. The method of Claim 10 in which T_3 is more than about 1°C above T_2.

12. The method of Claim 10 in which T_3 is more than about 20°C above T_2.

13. The method of Claim 10 in which T_3 is in the range of about 100°C to about 200°C.

14. The method of Claim 10 in which T_3 is in the range of about 140°C to about 160°C.

15. The method of Claim 10 in which the annealing time is more than about 1 minute.

16. The method of Claim 10 in which the annealing time is about 5 minutes or longer.

17. The method of Claim 10 in which in which the cooling of the amorphous photorefractive material is conducted at a cooling rate that is effective to maintain the single phase.

18. The method of Claim 17 in which the cooling rate is faster than about 5°C per minute

19. The method of Claim 17 in which the cooling rate is faster than about 50°C per minute

20. The method of Claim 17 in which the cooling rate is faster than about 100°C per minute.

21. The method of Claim 17 in which the heating of the photorefractive material to the temperature T_3 or higher is repeated.

22. A photorefractive article with an extended lifetime, comprising:

a photorefractive material, wherein the photorefractive material has an optical property that degrades when the photorefractive material is maintained at a temperature in the range of T_1 to T_2; and wherein the optical property of the photorefractive material is at least partially restored upon heating the photorefractive material to a temperature T_3 and cooling the photorefractive material to a temperature in the range of T_1 to T_2, wherein T_3 is greater than T_2;

a heat source operatively disposed to heat the photorefractive material; and

a substrate in contact with the photorefractive material.

23. The photorefractive article of Claim 22 in which the photorefractive article is part of an optical device.

24. The photorefractive article of Claim 23 in which the optical device is selected from the group consisting of phase conjugator, mirror, amplifier, spatial light modulator, optical processor, and holographic optical storage device.

25. The photorefractive article of Claim 23 in which the photorefractive material comprises an amorphous photorefractive material.

26. The photorefractive article of Claim 25 in which in which the amorphous photorefractive material is in the form of a film having a thickness in the range of about 1 micron to about 1 millimeter.

27. The photorefractive article of Claim 22 in which the substrate has a shear modulus greater than about 10^7 Pa

28. The photorefractive article of Claim 22 in which the substrate has an optical density of about 0.2 or less

29. The photorefractive article of Claim 22 in which the substrate has an optical density of about 0.05 or less

30. The photorefractive article of Claim 22 in which the substrate comprises a material selected from the group consisting of soda lime glass, silica glass, borosilicate glass, gallium nitride, gallium arsenide, sapphire, quartz glass, polyethylene terephthalate, and polycarbonate.

31. The photorefractive article of Claim 30 in which the substrate is soda lime glass

32. The photorefractive article of Claim 22 further comprising at least one substantially transparent electrode.

33. The photorefractive article of Claim 32 in which the transparent electrode is a film comprising a material selected from the group consisting of conducting metal oxide, conducting polymer, and metal.

34. The photorefractive article of Claim 33 in which the transparent electrode is a film comprising a material selected from the group consisting of indiumtinoxide, tin oxide, zinc oxide, polythiophene, polyphenylenevinylene, gold, aluminum, and polyaniline.

35. The photorefractive article of Claim 32 in which the transparent electrode is a film comprising indiumtinoxide.

36. The photorefractive article of Claim 35 in which the photorefractive article is part of an optical device.

37. The photorefractive article of Claim 36 in which the optical device is selected from the group consisting of phase conjugator, mirror, amplifier, spatial light modulator, optical processor, and holographic optical storage device.

38. The photorefractive article of Claim 36 in which the heat source is at least partially embedded in the photorefractive material.

39. The photorefractive article of Claim 36 in which the heat source comprises a bar heater.

40. The photorefractive article of Claim 36 in which the heat source comprises an infrared laser.

41. The photorefractive article of Claim 40 in which the infrared laser is selected from the group consisting of diode laser, fiber laser and gas laser.

42. The photorefractive article of Claim 40 further comprising a lens operatively disposed to focus the infrared laser on the photorefractive article.